

TELECOMMUNICATIONS SYSTEMS ENGINEERING B. Eng.

SEMESTER 2

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Year 2015/16

Course Name:	Professional Communication	Course Code:	595000306
Year:	1	Semester:	2
Credits (ECTS):	3	Credit Hours:	2
Area:	Common UPM Skills	Type:	Basic / Required
Term:	Spring	Language:	Spanish
Prerequisites / Co-requisites:		None	
Coordinator:		Consuelo L. Regidor	
Bachelor Engineering Program:		Telecommunications Systems Engineering Communications Electronics Engineering Sound and Image Engineering Telematics Engineering	

Course Contents

1. Writing expression.
2. Academic and professional writing practices.
3. Exposure and oral defense of academic and professional work.

ABET Student Outcomes

- (d) An ability to function on multidisciplinary teams
- (g) An ability to communicate effectively
- (h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

Study Outcomes (according to the Spanish program definition)

- CG 02 Skilled to searching and selecting information, critical reasoning and writing and defending the reasoning within the defined area
- CG 03 Ability to express oneself in oral and written form, and to convey information through documents and public presentations.
- CG 05 Ability for teamwork in multidisciplinary environments.
- CG 06 Ability for adaptability, negotiation, conflict resolution and leadership.

Specific outcomes of instruction (according to the Spanish program definition)

1. To be able to adequately synthesize information related to their studies.

Bibliography

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Year 2015/16

Course Name:	Circuit Analysis II	Course Code:	595000307
Year:	1	Semester:	2
Credits (ECTS):	6	Credit Hours:	4
Area:	Physics	Type:	Basic / Required
Term:	Fall / Spring	Language:	Spanish
Prerequisites / Co-requisites:		Workshop on Introductory Engineering Circuit Analysis I	
Coordinator:		Javier Luis Palmero	
Bachelor Engineering Program:		Telecommunications Systems Engineering Communications Electronics Engineering Sound and Image Engineering Telematics Engineering	

Course Contents

1. Magnetic coupling and transformers.
2. Transit regime
3. Frequency response
4. Two port networks

ABET Student Outcomes

- (a) An ability to apply knowledge of mathematics, science, and engineering
- (b) An ability to design and conduct experiments, as well as to analyze and interpret data
- (d) An ability to function on multidisciplinary teams

Study Outcomes (according to the Spanish program definition)

- CG 02 Ability to search and select information, develop critical thinking and produce and defend arguments within the area.
- CG 03 Ability to express oneself in oral and written form, and to convey information through documents and public presentations.
- CG 04 Ability to abstract, analyze, and synthesize, and to solve problems.
- CE B4 Knowledge and command of basic concepts on linear systems and related functions and transforms, theory of electrical circuits, electronic circuits, physical principles of semiconductors and logic families, electronic and photonic devices, materials technology and its application for solving problems of engineering.

Specific outcomes of instruction (according to the Spanish program definition)

1. Analyze circuits with magnetic coupling. Transformers and auto-transformers.
2. Characterize terminal out *cuadripolos* through the different families of parameters.
3. Learn about the concept of filter and its characterization.
4. Calculate the basic parameters of a resonant circuit (resonance frequency and quality factor and bandwidth).
5. Know the forms of interconnection of the four most common poles, and determine the most appropriate for each association family of parameters.
6. Analyzing the response in transitional arrangements at the time of first and second order circuits domain, establishing relations between the mathematical terms present in the solution and their corresponding physical interpretation.
7. Laplace's transformed applied to the analysis of circuits in transient.
8. Implement a simulation program of analog circuits for the resolution of circuits.
9. Through simulation and experimental measures to determine the parameters of a *cuadripolo* and the frequency response of a filter.
10. Simulate the behavior of circuits in transient.
11. Experiment with the basic parameters of a transmission line.
12. Complete experimental measures on RLC circuits.

Bibliography

- "Circuitos eléctricos. Introducción al Análisis y Diseño". Tercera edición. R.C. Dorf, J. A. Svoboda. Editorial Marcombo, 2000
- "Análisis de circuitos en ingeniería" Séptima edición. W. H. Hayt, Jr, J. E. Kemmerly, S. M. Durbin. Ed. McGraw Hill Interamericana, 2207
- "Análisis de circuitos lineales. Volumen I" Segunda edición. F. López, Ferreras. Editorial Ciencia 3, 2001
- "Análisis de circuitos lineales. Volumen II". Segunda edición. F. López. Ferreras. Editorial Ciencia 3, 2002
- "The analysis and design of linear circuits", Quinta edición. R. E. Thomas, A. J. Rosa. Editorial John Wiley & Sons, 2006
- "Circuitos eléctricos" C. K. Alexander, M. N. O. Sadiku. Editorial, McGraw-Hill, 2002
- "Colección de problemas de Análisis de Circuitos II: Cuestiones teóricas y ejercicios". Autores: Profesores del Departamento de ICS, 2009
- "Herramientas matemáticas para Análisis de Circuitos". Autor: Wilmar Hernández, 2010.
- "Cuestionario de Análisis de Circuitos". Autores: Wilmar Hernández, Javier Palmero y Manuel Labrador, 2010.

Year 2015/16

Course Name:	Electronics I	Course Code:	595000308
Year:	1	Semester:	2
Credits (ECTS):	6	Credit Hours:	4
Area:	Physics	Type:	Basic / Required
Term:	Fall / Spring	Language:	Spanish
Prerequisites / Co-requisites:		Math and Physics workshops Circuit Analysis I	
Coordinator:		Juan Blanco	
Bachelor Engineering Program:		Telecommunications Systems Engineering Communications Electronics Engineering Sound and Image Engineering Telematics Engineering	

Course Contents

1. Introduction to electronic systems
2. Electronic devices and components
3. Integrated electronic sub-systems

ABET Student Outcomes

- (a) An ability to apply knowledge of mathematics, science, and engineering
- (b) An ability to design and conduct experiments, as well as to analyze and interpret data
- (d) An ability to function on multidisciplinary teams
- (e) An ability to identify, formulate, and solve engineering problems
- (f) An understanding of professional and ethical responsibility
- (g) An ability to communicate effectively
- (h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Study Outcomes (according to the Spanish program definition)

- CG 02 Ability to search and select information, develop critical thinking and produce and defend arguments within the area.
- CG 04 Ability to abstract, analyze, and synthesize, and to solve problems.
- CG 05 Ability for teamwork in multidisciplinary environments.
- CE B4 Knowledge and command of basic concepts on linear systems and related

functions and transforms, theory of electrical circuits, electronic circuits, physical principles of semiconductors and logic families, electronic and photonic devices, materials technology and its application for solving problems of engineering.

CE TEL 12 Ability to use different energy sources, especially solar photovoltaic and thermal, as well as the foundations of electro-technics and power electronics.

Specific outcomes of instruction (according to the Spanish program definition)

1. Understand the nomenclature and basic properties of elementary signals which are used in electronic circuits.
2. Understand the main characteristics of the functional blocks that make up a basic electronic system (amplifier, attenuator, supply, ADC, DAC).
3. Understand the block diagram of simple electronic systems applied in the telecommunications sector
4. Learn about the function and basic characteristics of passive electronic components (resistance, capacitor and coil). Know their basic properties.
5. Understand the model and the basic properties of amplifiers and its implementation with ideal operational amplifiers.
6. Learn about the function and basic characteristics of active electronic components (diode, transistor, bipolar and unipolar).
7. Locate the features and relevant applications of components and subsystems in the technical literature.

Bibliography

Hambley: "Electrónica", 2ª ed. Prentice Hall 2001.

Sedra y Smith: "Circuitos Microelectrónicos", 5ª, ed. McGraw-Hill

Malvino: "Principios de electrónica", 7ª ed. McGraw-Hill, 2007.

Storey: "Electrónica, de los sistemas a los componentes", Addison-Wesley, Iberoamericana, 1995.

Year 2015/16

Course Name:	Calculus II	Course Code:	595000309
Year:	1	Semester:	2
Credits (ECTS):	6	Credit Hours:	4
Area:	Mathematics	Type:	Basic / Required
Term:	Fall / Spring	Language:	Spanish
Prerequisites / Co-requisites:		None	
Coordinator:		Juana Sendra	
Bachelor Engineering Program:		Telecommunications Systems Engineering Communications Electronics Engineering Sound and Image Engineering Telematics Engineering	

Course Contents

1. Differential calculus of real functions of several real variables
2. Differential calculus of vector functions
3. Double integration
4. Curved integration
5. Analytical functions
6. Complex integration

ABET Student Outcomes

- (a) An ability to apply knowledge of mathematics, science, and engineering
- (b) An ability to design and conduct experiments, as well as to analyze and interpret data
- (d) An ability to function on multidisciplinary teams

Study Outcomes (according to the Spanish program definition)

CE-B1 - Ability to solve mathematic problems that may come up in engineering. Ability to apply knowledge on: linear algebra, geometry, differential geometry, differential and integral calculus, differential equations, partial-differential equations, numeric methods, numeric algorithms, statistics and optimization.

Specific outcomes of instruction (according to the Spanish program definition)

1. Capability of ordering and relating ideas with the help of mathematical methods.
2. Understand the need to relate the intuition with the precision and rigor to formulate and address technical and scientific issues.
3. Recognize the need for abstraction to transfer physical problems information to mathematical forms that facilitate their resolution.
4. Acquire skills in calculating and conscious of the need to achieve results through the resolution of exercises and problems.

5. Understand the interest of the infinitesimal analysis of one and several variables like tool basic in studies related to Telecommunications.
6. Develop the capacity to apply the equations and differential, partial differential, as mathematical model for solving problems in engineering.
7. Verify the importance of complex integration to analyze the properties of analytic functions.
8. Acquire basic knowledge of the theoretical foundations of the vector spaces.
9. Apply the tools that systems in which signs in the presence of uncertainty can be treated.
10. Handle numerical and graphical statistical data analysis tools
11. Manage with ease the algebra of matrices and vectors.

Bibliography

Amillo, J.; Ballesteros, F.; Guadalupe, R.; Martín, L., “Cálculo, conceptos, ejercicios y sistemas de

computación matemática”. Mc Graw-Hill.

Apostol, T.M. Bibliografía Calculus. Tomos I y II. Reverté. Burgos, J. “Cálculo infinitesimal de varias variables”.McGraw-Hill.

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García, A.; López. A.; Rodríguez, G.; Romero,S.; De la Villa, A. “Cálculo II. Teoría y problemas de funciones de varias variables”. CLAGSA.

Stewart, J. “Cálculo multivariable”. Thomson Learning.

Year 2015/16

Course Name:	Programming II	Course Code:	595000310
Year:	1	Semester:	2
Credits (ECTS):	6	Credit Hours:	4
Area:	Informatics	Type:	Basic / Required
Term:	Fall / Spring	Language:	Spanish
Prerequisites / Co-requisites:		Programming I	
Coordinator:		Pablo Ramírez	
Bachelor Engineering Program:		Telecommunications Systems Engineering Communications Electronics Engineering Sound and Image Engineering Telematics Engineering	

Course Contents

1. The object oriented programming paradigm
2. Basic elements of the JAVA programming language
3. Advanced elements of the JAVA programming language
4. Data structures in JAVA
5. The input/output in JAVA management

ABET Student Outcomes

- (b) An ability to design and conduct experiments, as well as to analyze and interpret data
- (c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) An ability to function on multidisciplinary teams
- (g) An ability to communicate effectively
- (h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) A recognition of the need for, and an ability to engage in life-long learning
- (j) A knowledge of contemporary issues
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Study Outcomes (according to the Spanish program definition)

- CG 03 Ability to express oneself in oral and written form, and to convey information through documents and public presentations.
- CG 04 Ability to abstract, analyze, and synthesize, and to solve problems.

- CG 05 Ability for teamwork in multidisciplinary environments.
- CE B2 Basic knowledge on using and programming computers, operating systems, databases and software used in engineering.

Specific outcomes of instruction (according to the Spanish program definition)

1. Understand the basics of object-oriented programming.
2. Understand the basics of object-oriented design.
3. Understand a design object-oriented to construct a system of medium complexity.
4. Learn about the JAVA language syntax, as well as the definition of classes, interfaces, and the instantiation of objects.
5. Apply inheritance relationships in the design of JAVA applications.
6. Use polymorphism in the design of JAVA applications.
7. Apply the management of errors and exceptions in JAVA.
8. Use standard JAVA packages.
9. Use collections to the representation of data structures.
10. Use the JAVA package of input / output.
11. Apply the JAVA object serialization.
12. Apply the paradigms of the object oriented programming for the realization of systems of medium complexity.
13. Manage integrated development environments (IDE).

Bibliography

- “JAVA: How to Program”, Paul Deitel - Deitel & Associates, Inc.; Harvey Deitel - Deitel & Associates, Inc. Editorial: Prentice Hall
- “Head First JAVA”, Kathy Sierra; Bert Bates. Editorial: O'Reilly Media, Inc.
- “El lenguaje de programación JAVA”. Ken Arnold, James, Gosling y David Holmes. Editorial: Addison Wesley
- “Thinking in in JAVA”, Bruce Eckel. Editorial:Prentice Hall.

Year 2015/16

Course Name:	Search Techniques and Information Systems	Course Code:	595000311
Year:	1	Semester:	2
Credits (ECTS):	3	Credit Hours:	2
Area:	Common UPM Skills	Type:	Basic / Required
Term:	Fall / Spring	Language:	Spanish
Prerequisites / Co-requisites:		None	
Coordinator:		Javier Malagón	
Bachelor Engineering Program:		Telecommunications Systems Engineering Communications Electronics Engineering Sound and Image Engineering Telematics Engineering	

Course Contents

1. Databases
2. Data tables
3. Tools and techniques for searching information
4. Citations, references and bibliography
5. Other information in engineering resources

ABET Student Outcomes

- (b) An ability to design and conduct experiments, as well as to analyze and interpret data
- (d) An ability to function on multidisciplinary teams
- (g) An ability to communicate effectively
- (h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) A recognition of the need for, and an ability to engage in life-long learning
- (j) A knowledge of contemporary issues

Study Outcomes (according to the Spanish program definition)

- CG 02 Ability to search and select information, develop critical thinking and produce and defend arguments within the area.
- CG 11 Skills for the use of Information and Communication Technologies.
- CE B2 Basic knowledge on using and programming computers, operating systems, databases and software used in engineering.
- CE TEL 03 Ability to use computer tools of search of bibliographical resources or of information related to the telecommunications and the electronics.

Specific outcomes of instruction (according to the Spanish program definition)

1. Locate correctly the required information.
2. Analyze the information found and discard the irrelevant.
3. Process the information from different sources and synthesize it properly.
4. Contrast the ideas contributed by different sources.
5. Make an assessment about the rigor of the source of origin of information.
6. Identify the stages in the process of search and information retrieval.
7. Understand the criteria to evaluate the quality of information from a source on the Internet.
8. Perform searches and information retrieval in library catalogues.
9. Perform searches and information retrieval in databases.
10. Know and handle the specific repositories of information engineering, patents and standards, as well as the basic concepts associated with them.
11. Use search engines and meta-search engines.
12. Use the main sources of information existing on the Internet on telecommunications.
13. Reflect searches and information retrieved at citations, bibliography and references.
14. Know the rules about how to cite and reference in engineering (standard ISO 690 and IEEE style).
15. Prepare a bibliography and a list of references following the standard ISO 690 and the IEEE style.
16. The existence of management systems (RDBMS) database and its possibilities.
17. Design of databases using the entity-relation model.
18. Implement, in basic form, databases using the relational model.
19. Handling, basic, Microsoft Access for the creation and operation of simple databases.
20. Query in Access.
21. Simple query in SQL.
22. Generate data tables in spreadsheets.
23. Generate graphs from data tables.

Bibliography

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